III. COMPETITIVE FACTORS: U.S. INDUSTRY AND THE WORLD MARKET

A. Historical Perspective

After significant real growth in machine tool demand resulting from the investment boom of the 1960's, little further growth was anticipated in the early 1970's. Therefore, the marketing strategy in the early 1970's for most foreign and domestic machine tool producers was to increase their market shares. Industrialized countries, in particular, concentrated on exports. As the U.S. has consistently been the largest world market, and has had the least restrictions on foreign competition, it became the market on which all exporters focused.[1]

The demand for machine tools increased in the U.S. in the latter half of the 1970's, largely in response to a major re-tooling of the transportation sector of the U.S. economy (in turn fueled by increases in energy prices). The U.S. machine tool industry responded by increasing production lead-times to 18 to 24 months or more, depending on the type of machine required. Industry experts differ on the reasons why the U.S. machine tool industry pursued this course. However, it can be stated with assurance that this practice by the industry in the face of increased demand has historically been associated with increased import penetration.[2] In 1978, import penetration in the domestic machine tool market was about 30%; by 1982 it was almost 45% of consumption in terms of units.

B. Current Factors

1. Quality

According to the International Trade Commission (ITC) study, "Competitive Assessment of the U.S. Metalworking Machine Tool Industry," the U.S. industry is regarded as the supplier of choice in high technology machine tools designed for highly specialized operations. In those operations which produce machines for components, military equipment, and long assembly line operations, U.S. machines are dominant with respect to quality. However, in the standard-type machine tools, which are primarily ordered by independent job shops and which probably have the greatest potential for increased future machine tool demand, U.S. equipment is perceived to be of lesser quality by domestic purchasers than that of major foreign producers.[3]

The National Research Council's (NRC) report, "The U.S.

Machine Tool Industry and the Defense Industrial Base," notes that offshore firms must export reliable machine tools in order to eliminate the need for maintaining a large, after-sales servicing force in a foreign country. Conversely, in the face of order backlogs, domestic firms have tended to emphasize higher production rates as opposed to product reliability.[4]

2. Delivery

The ITC study noted that the longer lead times associated with U.S. machine tool orders appeared to be an important factor to domestic purchasers, particularly for purchases of the standardized machines. Respondents to an ITC survey of machine tool purchasers indicated that foreign producers gained market shares in part because of their ability to provide more timely delivery.[5] For example, according to the NRC report, in the 1970's the domestic industry required a one and one-half to two year wait for the delivery of machine tools, while Japanese manufacturers made deliveries within only one or two months.[6] Some foreign producers have also warehoused the more standard-type machines in the U.S., enhancing their ability to deliver products in a more timely manner than their U.S. counterparts.[7]

3. Service

According to the ITC study, the U.S. producers' after sales service on specialty machine tools mirrors those products' reputation for quality: the U.S. producer is superior to that of foreign competitors. In the lower end of the market, however, after-sales service for foreign-made standard machine tools is considered to be superior to that of U.S. tools. The quality of after-sales service was described in the ITC study as including the ability to provide spare parts in a timely manner, implementing warranties and product servicing, communicating product changes to the customer, and customer training. Again, as the foreign-made standard machine tool is often of superior quality, less servicing is needed than for U.S.-made machine tools of the same type.[8]

4. Price

According to the ITC survey, as a determinant of price, the cost of raw materials appears to be approximately 38% of the value of shipments. Although the ITC study notes that little information on raw material costs of foreign producers is available, the study assumes such costs are relatively equal throughout the world. However, other costs such as financing, fixed overhead, and particularly wages are higher for U.S. industries. For example, the ITC study notes that wages paid to production workers in France, Italy, Japan and the United Kingdom are, on average, two-thirds of those paid to production workers in the U.S. With regard to white collar workers, an engineer in the U.S. with 1 year of experience earns approximately twice that of a Japanese engineer and four times that of Taiwanese and Korean engineers.[9]

In the NRC report, an attempt was made to assess the costs of producing domestic and foreign machine tools, despite the paucity of data alluded to in the ITC study. The NRC report provides an estimated breakdown of a U.S. producer's versus a Japanese producer's costs in manufacturing a conventional computer numerical control (CNC) lathe as shown in Table III-1. While the study notes that ". . . the table is intended only as an indication of general trends . . . ", the 21% price differential in the example was substantiated as typical of the experience of machine tool purchasers interviewed in the course of the NRC study and supports the view that foreign competitors have a distinct advantage over their domestic counterparts.[10]

Thus, with labor approximating 55% to 60% of the cost of producing machine tools, U.S. producers are at a distinct price disadvantage compared to their foreign counterparts. Responses by producers and importers to the ITC's survey on the question of price indicated that importers have a significant advantage over U.S. producers of standard-type machine tools.[11]

Specifically, the price of machine tools is often the decisive factor for the small and medium sized purchaser - a segment of the manufacturing sector expected to become the predominant market for future machine tool consumption.[12] However, at the higher end of the market, where the quality of U.S. machines are regarded as superior, price appears to be less a determinant of competitiveness.[13]

Table III-1

Comparative Costs of CNC Lathe Tool: U.S. vs. Japan, 1981

	United States		Japan	
	Amount	Percent	Amount	Percent
Manufacturers' Selling Price	$120,000		$92,240	
Gross margin a/	48,000		36,900	
Manufacturing cost	72,000	100	55,340	100
Purchased material b/	32,400	45	22,680	41
Labor and burden	39,600	55	32,660	59
Direct labor c/				
Dollars	9,900	14	8,165	15
(Hours)	1,081		1,384	
Indirect and burden d/	29,700	41	24,495	44

a/ Gross margin of 40 percent is assumed for both U.S. and Japanese producers.

b/ For the U.S., purchased materials are 45 percent of manufacturing cost; for Japan, the cost is 30 percent less than the U.S. material cost.

c/ For the U.S., labor cost is estimated on the basis of a 1 to 3 ratio between direct labor and indirect labor and burden. Unit hours are derived by dividing direct labor cost by 1981 average hourly earnings of production workers in metal-cutting machine industry ($9.16). (U.S. Bureau of Labor Statistics)
For Japan, direct labor hours per unit are derived by increasing U.S. levels by 28 percent, in accordance with 1980 estimates by the Japan Productivity Center of comparative levels in the industrial machinery indsutry. The 1981 hourly average for Japan is $5.90.

d/ Indirect and burden are derived as residuals. The higher proportion for Japan (despite lower fringe benefits) reflects the higher ratio of non-production workers to all employees in Japan's metalworking machinery industry (40 percent) compared with the U.S. industry ratio (30 percent), according to BLS data.

Source: U.S. Bureau of Labor Statistics, Japan Productivity Center, and Committee calculations.

National Research Council
Department of Defense

Differing exchange rates also have negatively impacted U.S. machine tool sales vis-a-vis price. The increased strength of the U.S. dollar compared to foreign currencies favors increased imports and negatively impacts exports of all commodities. The ITC study indicates that differences in relative inflation rates and changes in exchange rates have increased the competitiveness of foreign producers. The overall price of all imported goods has increased 8.6% less since 1976 than has the overall price of all U.S. goods.[14]

C. Future Market Trends

Unlike the sharp increase in U.S. transportation sector demand experienced in the late 1970's, it is anticipated that no one sector of the U.S. economy will exclusively spur such an increase in demand for machine tools in the future. Rather, it is expected that increases in domestic demand will result from modernization efforts employed in all manufacturing sectors, as economic growth and lower interest rates are gradually sustained in the current economic recovery period. While prior increases in demand for machine tools have developed from plant modernization in the larger, more dominant manufacturing industries, the bulk of the future U.S. demand for machine tools will come from the small-to-medium-sized corporations purchasing less technically superior products. This demand shift could place U.S. manufacturers at a competitive disadvantage, as foreign machine tool producers have tailored their product lines to precisely this market.[15]

In the near term, the DOC's "U.S. Industrial Outlook 1984" projects an 8% increase in the combined shipments of the machine tool and accessories industries over 1983 levels. Employment gains are expected to be marginal, with the industry operating at a loss at least through the first half of 1984. Export markets are expected to remain depressed, increasing at only a 6% rate for metal-cutting and an 8% rate for metal-forming machine tools. Imports are expected to continue to gain a greater share of the domestic market, with metal-cutting machine tool imports increasing 20% and imports of metal-forming tools increasing 16%.[16]

NOTES TO CHAPTER III

1. "Machine Tool Industry: Is There Life After Detroit?" Eli S. Lustgarten, Paine Webber Mitchell Hutchins Inc. Status Report, December 6, 1982, p.4.

2. Lustgarten, p.4.

3. "Competitive Assessment of the U.S. Metalworking Machine Tool Industry," Report to the United States International Trade Commission (ITC) on Investigation No. 332-149 under Section 332 of the Tariff Act of 1930, USITC Publication 1428, Washington, D.C., September 1983, p.xv.

4. "The U.S. Machine Tool Industry and the Defense Industrial Base," Committee on the Machine Tool Industry Phase II, Manufacturing Studies Board, Commission on Engineering and Technical Systems, National Research Council (NRC), National Academy Press, Washington, D.C., 1983, pre-publication copy, p. 39.

5. ITC, p.xiv.

6. NRC, p. 42.

7. ITC, p. xiv-xv.

8. ITC, p. xiv.

9. ITC, p. 98-99.

10. NRC, p. 42.

11. ITC, p. xiii-xiv.

12. Lustgarten, pp. 9-10.

13. ITC, p. 105.

14. ITC, p. 155-156.

15. Lustgarten, p. 10.

16. U.S. Industrial Outlook 1984, Department of Commerce, pre-publication copy (available in mid-January 1984), pp. 20-1--20-3.